Refine Search

Your wildcard search against 10000 terms has yielded the results below.

Your result set for the last L# is incomplete.

The probable cause is use of unlimited truncation. Revise your search strategy to use limited truncation.

Search Results -

Terms	Documents
L10 and (heterodyn$ or superimpos$ or pwm$ or pulse$)	11

Database: US Pre-Grant Publication Full-Text Database; US Patents Full-Text Database; US OCR Full-Text Database; EPO Abstracts Database; JPO Abstracts Database; Derwent World Patents Index; IBM Technical Disclosure Bulletins

Search: 10/773,668

Refine Search | Recall Text | Clear | Interrupt

Search History

DATE: Monday, February 19, 2007 **Purge Queries** Printable Copy Create Case

Set Name side by side	Query	Hit Count	Set Name result set
	DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; THES=ASSIGNEE; PLUR=YES; OP=OR		
L11	L10 and (heterodyn$ or superimpos$ or pwm$ or pulse$)	11	L11
L10	L6 and (control$ with (electromagnetic$ with valve))	15	L10
L9	L6 and (control$ with ("electro-magnetic" with valve))	0	L9
L8	L6 and (control$ with ("electro-magnetic" adj valve))	0	L8
L7	L6 and (control$ with (electromagnetic$ adj valve))	0	L7
L6	l2 or l4 or l5	73	L6
	DB=USPT; THES=ASSIGNEE; PLUR=YES; OP=OR		
L5	(3592228 | 4982901 | 0555307 | 3172637 | 3366288 | 4826080 | 4520962 | 2607368 | 4365746 | 3967597 | 2619116 | 4280661 | 3412970 | 4060199)! [PN]	14	L5

DB=USPT,DWPI; THES=ASSIGNEE; PLUR=YES; OP=OR

L4	("4331317"| "5884850"| "3731881"| "DE 19626576A"| "WO2003100942A"| "DE 3021220A"| "EP 643289A")[ABPN1,NRPN,PN]	7	L4

DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; THES=ASSIGNEE; PLUR=YES; OP=OR

L3	l1	7	L3

DB=USPT,DWPI; THES=ASSIGNEE; PLUR=YES; OP=OR

L2	("4331317"| "5884850"| "3731881"| "DE 19626576A"| "WO2003100942A"| "EP 643289A")[URPN]	52	L2

DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; THES=ASSIGNEE; PLUR=YES; OP=OR

L1	3731881.pn. or 4331317.pn. or 5884850.pn.	7	L1

END OF SEARCH HISTORY

Hit List

First Hit

Your wildcard search against 10000 terms has yielded the results below.

Your result set for the last L# is incomplete.

The probable cause is use of unlimited truncation. Revise your search strategy to use limited truncation.

Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS

Search Results - Record(s) 1 through 10 of 11 returned.

☐ 1. Document ID: US 5312050 A

L11: Entry 1 of 11 File: USPT May 17, 1994

US-PAT-NO: 5312050
DOCUMENT-IDENTIFIER: US 5312050 A

TITLE: Electromagnetic fuel injector

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

☐ 2. Document ID: US 5271565 A

L11: Entry 2 of 11 File: USPT Dec 21, 1993

US-PAT-NO: 5271565
DOCUMENT-IDENTIFIER: US 5271565 A

TITLE: Fuel injector with valve bounce inhibiting means

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

☐ 3. Document ID: US 4676478 A

L11: Entry 3 of 11 File: USPT Jun 30, 1987

US-PAT-NO: 4676478
DOCUMENT-IDENTIFIER: US 4676478 A

TITLE: Electromagnetically-operated fuel injection valve

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

☐ 4. Document ID: US 4474332 A

L11: Entry 4 of 11 File: USPT Oct 2, 1984

US-PAT-NO: 4474332
DOCUMENT-IDENTIFIER: US 4474332 A

TITLE: Electromagnetic fuel injector having improved response rate

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

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☐ 5. Document ID: US 4384681 A

L11: Entry 5 of 11 File: USPT May 24, 1983

US-PAT-NO: 4384681
DOCUMENT-IDENTIFIER: US 4384681 A

TITLE: Electromagnetic fuel injector

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

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☐ 6. Document ID: US 4365746 A

L11: Entry 6 of 11 File: USPT Dec 28, 1982

US-PAT-NO: 4365746
DOCUMENT-IDENTIFIER: US 4365746 A

TITLE: Swirl injection valve

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

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☐ 7. Document ID: US 4280661 A

L11: Entry 7 of 11 File: USPT Jul 28, 1981

US-PAT-NO: 4280661
DOCUMENT-IDENTIFIER: US 4280661 A

TITLE: Intermittent injection type fuel injection valve

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

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☐ 8. Document ID: US 4232830 A

L11: Entry 8 of 11 File: USPT Nov 11, 1980

US-PAT-NO: 4232830
DOCUMENT-IDENTIFIER: US 4232830 A

TITLE: Electromagnetic fuel injector

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWMC | Draw De

☐ 9. Document ID: US 4231525 A

L11: Entry 9 of 11 File: USPT Nov 4, 1980

US-PAT-NO: 4231525
DOCUMENT-IDENTIFIER: US 4231525 A

TITLE: Electromagnetic fuel injector with selectively hardened armature

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWMC | Draw De

☐ 10. Document ID: US 4218021 A

L11: Entry 10 of 11 File: USPT Aug 19, 1980

US-PAT-NO: 4218021
DOCUMENT-IDENTIFIER: US 4218021 A
** See image for Certificate of Correction **

TITLE: Electromagnetic fuel injector

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWMC | Draw De

Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS

Terms	Documents
L10 and (heterodyn$ or superimpos$ or pwm$ or pulse$)	11

Display Format: - Change Format

Previous Page Next Page Go to Doc#

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Your wildcard search against 10000 terms has yielded the results below.

Your result set for the last L# is incomplete.

The probable cause is use of unlimited truncation. Revise your search strategy to use limited truncation.

Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS

Search Results - Record(s) 11 through 11 of 11 returned.

☐ 11. Document ID: US 4033513 A

L11: Entry 11 of 11 File: USPT Jul 5, 1977

US-PAT-NO: 4033513
DOCUMENT-IDENTIFIER: US 4033513 A
** See image for Certificate of Correction **

TITLE: Electromagnetically operated valve

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS

Terms	Documents
L10 and (heterodyn$ or superimpos$ or pwm$ or pulse$)	11

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Search Results - Record(s) 1 through 10 of 11 returned.

☐ 1. Document ID: US 5312050 A

L11: Entry 1 of 11 File: USPT May 17, 1994

US-PAT-NO: 5312050
DOCUMENT-IDENTIFIER: US 5312050 A

TITLE: Electromagnetic fuel injector

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw D

☐ 2. Document ID: US 5271565 A

L11: Entry 2 of 11 File: USPT Dec 21, 1993

US-PAT-NO: 5271565
DOCUMENT-IDENTIFIER: US 5271565 A

TITLE: Fuel injector with valve bounce inhibiting means

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw D

☐ 3. Document ID: US 4676478 A

L11: Entry 3 of 11 File: USPT Jun 30, 1987

US-PAT-NO: 4676478
DOCUMENT-IDENTIFIER: US 4676478 A

TITLE: Electromagnetically-operated fuel injection valve

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw D

☐ 4. Document ID: US 4474332 A

L11: Entry 4 of 11 File: USPT Oct 2, 1984

US-PAT-NO: 4474332
DOCUMENT-IDENTIFIER: US 4474332 A

TITLE: Electromagnetic fuel injector having improved response rate

☐ 5. Document ID: US 4384681 A

L11: Entry 5 of 11 File: USPT May 24, 1983

US-PAT-NO: 4384681
DOCUMENT-IDENTIFIER: US 4384681 A

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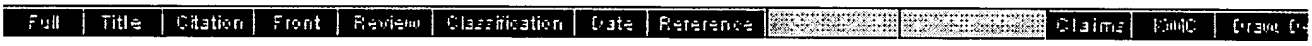
☐ 6. Document ID: US 4365746 A

L11: Entry 6 of 11 File: USPT Dec 28, 1982

US-PAT-NO: 4365746
DOCUMENT-IDENTIFIER: US 4365746 A

TITLE: Swirl injection valve



☐ 7. Document ID: US 4280661 A

L11: Entry 7 of 11 File: USPT Jul 28, 1981

US-PAT-NO: 4280661
DOCUMENT-IDENTIFIER: US 4280661 A

TITLE: Intermittent injection type fuel injection valve

☐ 8. Document ID: US 4232830 A

L11: Entry 8 of 11 File: USPT Nov 11, 1980

US-PAT-NO: 4232830
DOCUMENT-IDENTIFIER: US 4232830 A

TITLE: Electromagnetic fuel injector

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw D

☐ 9. Document ID: US 4231525 A

L11: Entry 9 of 11 File: USPT Nov 4, 1980

US-PAT-NO: 4231525
DOCUMENT-IDENTIFIER: US 4231525 A

TITLE: Electromagnetic fuel injector with selectively hardened armature

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw D

☐ 10. Document ID: US 4218021 A

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US-PAT-NO: 4218021
DOCUMENT-IDENTIFIER: US 4218021 A
** See image for Certificate of Correction **

TITLE: Electromagnetic fuel injector

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw D

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Search Results - Record(s) 11 through 11 of 11 returned.

☐ 11. Document ID: US 4033513 A

L11: Entry 11 of 11 File: USPT Jul 5, 1977

US-PAT-NO: 4033513
DOCUMENT-IDENTIFIER: US 4033513 A
** See image for Certificate of Correction **

TITLE: Electromagnetically operated valve

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Drawing De

Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS

Terms	Documents
L10 and (heterodyn$ or superimpos$ or pwm$ or pulse$)	11

Display Format: - Change Format

Previous Page Next Page Go to Doc#

L11: Entry 3 of 11 File: USPT Jun 30, 1987

US-PAT-NO: 4676478
DOCUMENT-IDENTIFIER: US 4676478 A

TITLE: Electromagnetically-operated fuel injection valve

DATE-ISSUED: June 30, 1987

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kiuchi; Hideo	Aichi			JP

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Nippondenso Co., Ltd.	Kariya			JP	03

APPL-NO: 06/799251 [PALM]
DATE FILED: November 18, 1985

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
JP	59-276901	December 26, 1984

INT-CL-ISSUED: [04] F16K 31/06

INT-CL-CURRENT:

TYPE IPC	DATE
CIPP F02 M 51/06	20060101

US-CL-ISSUED: 251/129.08; 251/129.15, 251/129.21, 123/472, 335/227, 239/585
US-CL-CURRENT: 251/129.08; 123/472, 239/585.5, 251/129.15, 251/129.21, 335/227

FIELD-OF-CLASSIFICATION-SEARCH: 251/129.15, 251/129.21, 251/129.08, 123/472, 335/227, 239/585
See application file for complete search history.

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

Search Selected Search ALL Clear

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL

☐	2853659	September 1958	Herion	251/129.15 X
☐	3071714	January 1963	Hadekel	335/227
☐	3820757	June 1974	Siebel	251/129.21
☐	4331317	May 1982	Kamai et al.	
☐	4419642	December 1983	Kramer et al.	335/227

FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	CLASS
725702	March 1955	GB	251/129.15
437874	January 1975	SU	251/129.21

ART-UNIT: 347

PRIMARY-EXAMINER: Rosenthal; Arnold

ATTY-AGENT-FIRM: Cushman, Darby & Cushman

ABSTRACT:

An electromagnetically-operated fuel injection valve has a magnetic circuit comprising a valve casing, a stator core on which an electromagnetic coil is wound, an armature core, and an air gap between the stator core and the armature core. At least one of the valve casing, the stator core and the armature core is so configuared that the magnetic flux passing therethrough is saturated substantially at the time the armature core is fully attracted to inject fuel. A magnetic restrictor at which the cross-sectional area for the magnetic flux is reduced than that at the other portion is provided at least at a portion of the valve casing, the stator core and the armature core so that the magnetic flux is saturated thereat substantially at the time the armature core is attracted fully.

9 Claims, 4 Drawing figures

Previous Doc Next Doc Go to Doc#